Remarks

Claims 1-22 were originally pending in this application. No claims are canceled. No claims are amended. New claims 23-26 are added without introducing new matter. As a result, claims 1-26 are pending for examination with claims 1, 11, 17, 22, 23, and 26 being independent claims.

Rejections Under 35 U.S.C. § 102

Claims 1-22 were rejected under 35 U.S.C. § 102(b) as being anticipated by the teaching of Mani in U.S. Patent No. 6,017,433 (hereinafter Mani).

Mani teaches desalting biologically sensitive streams (such as sucrose, dextrose, and high fructose syrups) with electrodeionization devices (EDI). The streams are acidified to a pH of less than or about 3. (Mani at Abstract, column 5, lines 23 *et seq.*) The acidified solution is processed in an EDI device to soften and desalt the solution. (Mani at column 5, lines 36-56.) The desalted product from this EDI device is further desalted in a secondary EDI. (Id. at column 5, lines 56 *et seq.*, see also FIG. 4.) The first EDI is operated such that water splitting is fairly low and the secondary EDI is operated in a substantially water splitting mode. (Id. at column 5, lines 36-40 and lines 57-63.)

Mani fails to teach a method of producing treated water comprising a step of introducing water from a point of entry into an electrodeionization device. In particular, Mani fails to teach introducing water that is potable or non-potable into an electrodeionization device from a water source as a point of entry. (Specification at page 10, lines 27 *et seq.*) Instead, Mani teaches desalting biologically sensitive streams. (Mani at column 6, lines 5 *et seq.*) These streams would not be considered as water streams by those ordinarily skilled in the art.

Mani also fails to teach a method comprising a step of distributing at least a portion of treated water to a point of use, which, as described in the present specification, can be an appliance or system for providing water suitable for household or residential use. (See Specification at page 11, lines 16 *et seq.*) Instead, Mani teaches desalting HFCS (high fructose corn syrup) which is not delivered to an appliance or a system for providing water suitable for

household or residential use. Mani thus fails to disclose a method with a step of distributing treating water to a point of use.

Thus, independent claims 1 and 11 cannot be anticipated by the teaching of Mani because the reference fails to disclose each and every recited element in these claims.

Dependent claims 2-10 depend from independent claim 1 and further recite additional features of the invention. Dependent claims 12-16 depend from independent claim 11 and also recite additional features of the invention. Notably, Mani fails to teach a method of producing treated water further comprising a step of distributing at least a portion of the treated water to a point of use based on a measured water property. Mani also fails to disclose a method of producing treated water comprising a step of storing treated water in the reservoir system which can be pressurized. These dependent claims, therefore, cannot be anticipated by the teaching of Mani because it fails to disclose each and every element respectively recited therein.

Mani also fails to disclose a water treatment system comprising a reservoir system fluidly connected to a point of entry which, as discussed above, provides water to be treated. Thus, Mani cannot anticipate independent claim 17 because it fails to disclose each and every recited element.

Dependent claims 18-21 further recite additional features of the inventive system. Mani also cannot anticipate these dependent claims for at least the same reasons discussed above and also because Mani fails to disclose the additional features recited in these claims. For example, Mani fails to disclose a system comprising a distribution system fluidly connected downstream of the reservoir system and to the point of use.

Independent claim 22 also cannot be anticipated by the teaching of Mani for at least the same reasons discussed above.

Claims 17-22 were rejected under 35 U.S.C. § 102(e) as being anticipated by the teaching of Liang et al. in U.S. Patent Publication No. US2003/0089609 (hereinafter Liang).

Liang teaches an apparatus for fluid purification and methods of manufacture and use thereof. The disclosed fluid purification apparatus is constructed and arranged to produce a non-radial flow therein. Typically, a pressure vessel surrounds the purification apparatus. (Liang at paragraph 8.)

Liang however fails to disclose a water treatment system comprising a power supply for providing electrical current through the electrochemical device and a controller for regulating the electrical current below a limiting current density. Thus, because Liang fails to disclose each and every element of independent claims 17 and 22, these claims cannot be anticipated by the teaching of this reference.

Dependent claims 18-21 depend from independent claim 17. These dependent claims further recite additional features of the invention and likewise cannot be anticipated by the teaching of Liang.

Claims 17-22 are rejected under 35 U.S.C. § 102(e) as being anticipated by the teaching of Rela in U.S. Patent No. 6,607,668 (hereinafter Rela).

Rela teaches a water purifier having a control system that integrally controls the components of the system. The water purifier includes a plurality of unit operations that represent stages in the water purification process. Supply water is pretreated by directing it into a sediment pre-filter module, a softener module, and a sediment removal and dechlorination module. (Rela at Abstract.) The pre-treated water is supplied to a reverse osmosis module which separates the water into two streams, a purified water stream and a concentrate stream. (Id.) The purified water is then passed to an electrodeionization module which further purifies the water. (Id.) Purified water from the electrodeionization module is further treated in an ultraviolet sterilization module. (Id.) The sediment pre-filter module incorporates an automated cleaning or backwashing feature to flush the ceramic elements therein to remove accumulated particles from the surfaces of the ceramic elements. (Rela at column 5, line 66 – column 6, line 14.) Flushing the ceramic elements is performed at predetermined intervals by utilizing a flow of high velocity water stream from a pure water reservoir 12 in a direction opposite to the direction of the flow of supply water through the tubular element housing. (Id.) A water quality monitor measures ionic concentration in pure water outlet from the electrodeionization module which the control system utilizes to calculate electrical voltage and current directed to the module so that optimum outlet water quality is achieved. (Column 3, lines 62-67.) In particular, control of the electrodeionization module may entail measuring the flow rate and pressure of process streams, electrode streams, concentrate streams in the electrodeionization module. Control may further entail determining whether flow rates and/or pressures of the process streams, electrode streams,

and concentrate streams are within allowable operating margins and/or non-optimal conditions to adjust valves to change the flow rate and/or pressure of the upstream reverse osmosis permeate stream and/or the reverse osmosis concentrate stream. (Rela at column 4, lines 43-55.) The method of controlling the water purifying system may also involve measuring ionic concentration in the water at a location that provides an indication of quality of water, determining whether the measured ionic concentration is within allowable margins and adjusting the electrodeionization module when the measured ionic concentration is determined to be outside of allowable margins or when it is considered non-optimal. (Id. at column 4, lines 56-65.) Rela thus discloses integrating the various unit operations of a water purification system under the control of a controller.

Rela, however, fails to disclose a water treatment system comprising an electrochemical device fluidly connected to a point of entry and to a reservoir system. Rela also fails to disclose a water treatment system comprising a power supply for providing an electrical current to the electrochemical device and a controller for regulating the electrical current below a limiting current density. Instead, Rela recognizes that hardness species may precipitate in the electrodeionization module because it would be operated to regenerate ion exchange media contained therein, with hydrogen and hydroxyl species/species generated by water splitting, and thus relies on various softening subsystems to remove hardness-causing species upstream of the module.

As noted above, the water purifier disclosed by Rela includes a reservoir that is used to flush a pretreatment stage, presumably in a reverse fluid direction. In operation, the reservoir cannot be connected to an electrochemical device in the disclosed system because the pre-treatment stage is flushed by water from the reservoir. Thus, the electrochemical device of Rela cannot be fluidly connected to the reservoir. Rela also fails to disclose controlling a power supply that provides electrical current to an electrochemical device such that the delivered current is below a limiting current density. Thus, Rela cannot anticipate independent claims 17 and 22 because it fails to disclose each and every element recited therein.

Dependent claims 18-21 depend from independent claim 17 and recite additional features of the invention. These dependent claims also cannot be anticipated by the teaching of Rela for at least the same reasons discussed above.

Accordingly, because the teaching of these references fails to anticipate claims 1-22, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102 is respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 1-16 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the teaching of Rela in view of the teaching of Carson et al. in U.S. Patent Publication No. US2004/0060823 (hereinafter Carson).

Applicants disagree that claims 1-16 would have been obvious over the teaching of Rela in view of the teaching of Carson. Contrary to what is alleged, Carson does not teach a system that is operated at a current level that suppresses or minimizes hydroxyl ion generation. Instead, Carson teaches operating an electrodialysis apparatus at an applied current level that splits water to produce hydroxide ions and hydrogen ions. Indeed, Carson states that a limiting current density exists because there is a maximum rate of diffusion of ions through diluting solutions (passed through the apparatus). (Carson at paragraph 0005.) To maximize the utilization of the apparatus, it is desirable to operate at the highest possible current densities. (Id.) Significantly, Carson notes that "splitting of water at conventional AX membranes at or near this limiting current densities is an unfortunate phenomenon which is unavoidable for practical purposes." (Carson at paragraph 0006.) That is, Carson observes that splitting water may be advantageous at greater than the limiting current density. To this end, Carson utilizes various configurations and techniques that increase the water splitting phenomenon to improve system performance. For example, Carson teaches controlling the current by segmenting the electrodes to allow different current densities at different regions of the apparatus. (See Carson at paragraph 0081.) Carson further notes that automatically controlling the current minimizes the power consumption while providing a maximum amount of anion resin having a desirable OH^{-1} state. (Carson at paragraphs 0076 to 0079.) Carson thus explicitly seeks to generate hydroxyl ions.

Carson also teaches using various ion exchange materials in the compartments of the apparatus that avoids unacceptable product water generated during a portion of the current reversal procedure. In particular, Carson notes that in conventional ED/EDI stacks, the resistivity of produced water increases until hydrogen and hydroxyl ions have been regenerated (by water splitting) thereby producing unacceptable product. (Id. at paragraph 0104.) Carson

notes that the disclosed system, in contrast to a conventional system, does not exhibit or produce unacceptable water product during polarity reversal operations because the selected ion exchange types and configurations in the compartments are already regenerated by the hydrogen and hydroxyl ions generated by splitting water. (Id. at paragraph 0105.) Thus, in Carson's apparatus there is no delay or lag associated in waiting for the ion exchange material to be regenerated by the hydrogen and hydroxyl ions. (Id.) Plainly stated, Carson directly teaches splitting water and indeed seeks to improve water splitting to facilitate and optimize operation of the electrochemical device.

Therefore, because Carson, like Rela, fails to teach, suggest, or provide any motivation for applying current to an electrochemical device at a level that suppresses hydroxyl ion generation, the rejection is improper as failing to support a *prima facie* case of obviousness. Further, any *prima facie* case is rebutted because the proposed combination, even if possible, and which Applicants do not concede, would not result in the method as claimed because it would lack at least one element recited in claims 1-16.

Accordingly, because claims 1-16 would not have been obvious over the teaching of Rela in view of the teaching of Carson at least for the reasons discussed above, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103 is requested.

New Claims

New claims 23-26 are added without introducing new matter. Support for these claims can be found throughout the application as originally filed. The subject matter of these new claims is patentable.

CONCLUSION

In view of the foregoing Amendments and Remarks, this application is now in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes that the application is not in condition for allowance, the Examiner is requested to call Applicants' attorney at the telephone number listed below.

If this Response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee

occasioned by this Response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50/0214.

Respectfully submitted,
Evgeniya Freydina et al., Applicants

By: _____

Elias Domingo, Reg. No. 52,827
Peter C. Lando, Reg. No. 34,654
LOWRIE, LANDO & ANASTASI, LLP
One Main Street
Cambridge, Massachusetts 02142
United States of America
Telephone: 617-395-7000
Facsimile: 617-395-7070

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